

**DESCRIPTION OF IMMATURE STAGES OF
PHYLLOPHAGA (TRIODONYX) LALANZA SAYLOR
(COLEOPTERA: MELOLONTHIDAE, MELOLONTHINAE)**

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Abstract.—Three larval stages and pupa of *Phyllophaga (Triodonyx) lalanza* Saylor are described based on a large series of samples obtained in sugar cane fields from Tepic, Nayarit, Mexico, where the larvae cause severe damage to the root system. Fully developed third-stage larvae (58–64 mm length) of this species are some of the biggest root-feeding white grubs in Latin America. Illustrations of diagnostic structures of third-stage larva and pupa are included.

Key Words.—Insecta, white grubs, morphology, taxonomy, sugar cane.

Resúmen.—Se describen los tres estados larvarios y la pupa de *Phyllophaga (Triodonyx) lalanza* Saylor, con base en series grandes de muestras obtenidas en los cañaverales de la región de Tepic, Nayarit, México, donde las larvas causan daños severos al sistema radicular. Las larvas de tercer estadio completamente desarrolladas alcanzan entre 58 y 64 mm de longitud, por lo cual representan una de las larvas edafícolas rizófagas más grandes descritas hasta el momento en América Latina. Se ilustran las estructuras diagnósticas para la identificación de la larva de tercer estado y la pupa.

In recent years (1993–1996) reports of damage by white grubs in sugar cane fields, black bean, chili pepper, and corn crops have increased in the state of Nayarit, Mexico. Larvae have seriously damaged nearly 1000 ha of sugar cane around Tepic city. Nearly 90% of the samples of larvae and adults obtained and studied by the authors were determined as *Phyllophaga (Triodonyx) lalanza* Saylor (Morón et al. 1996). In this paper, the third instar larva and pupa of this species are described, including the taxonomic characters and measures of the first and second instar larvae, and the third instar larva is briefly compared with the larvae of other species of *Phyllophaga*. Technical terms used are those of Ritcher (1966) and Morón (1986). The descriptions are based on 160 third instar larvae, 64 second instar larvae, 16 first instar larvae, two cast skins of third instar larvae and 8 pupae, reared from eggs or directly collected in the field (see Material Examined). Specimens studied are deposited in the following Mexican collections: Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias, SAGAR, Celaya, Guanajuato; Instituto de Biología, U.N.A.M. Mexico City; Departamento de Investigación en Ciencias Agrícolas, Benemérita Universidad Autónoma de Puebla, Puebla; Instituto de Ecología, A.C. Xalapa, Veracruz; Departamento Técnico de Campo, Ingenio de Puga, S.A. Tepic, Nayarit; the private collection of M.A. Morón, Xalapa, Veracruz; and in the collections of California Academy of Sciences, San Francisco; U.S. National Museum, Smithsonian Institution, Washington, D.C.; University of Nebraska State Museum, Lincoln; and Biosystematics Research Centre, Ottawa, Canada.

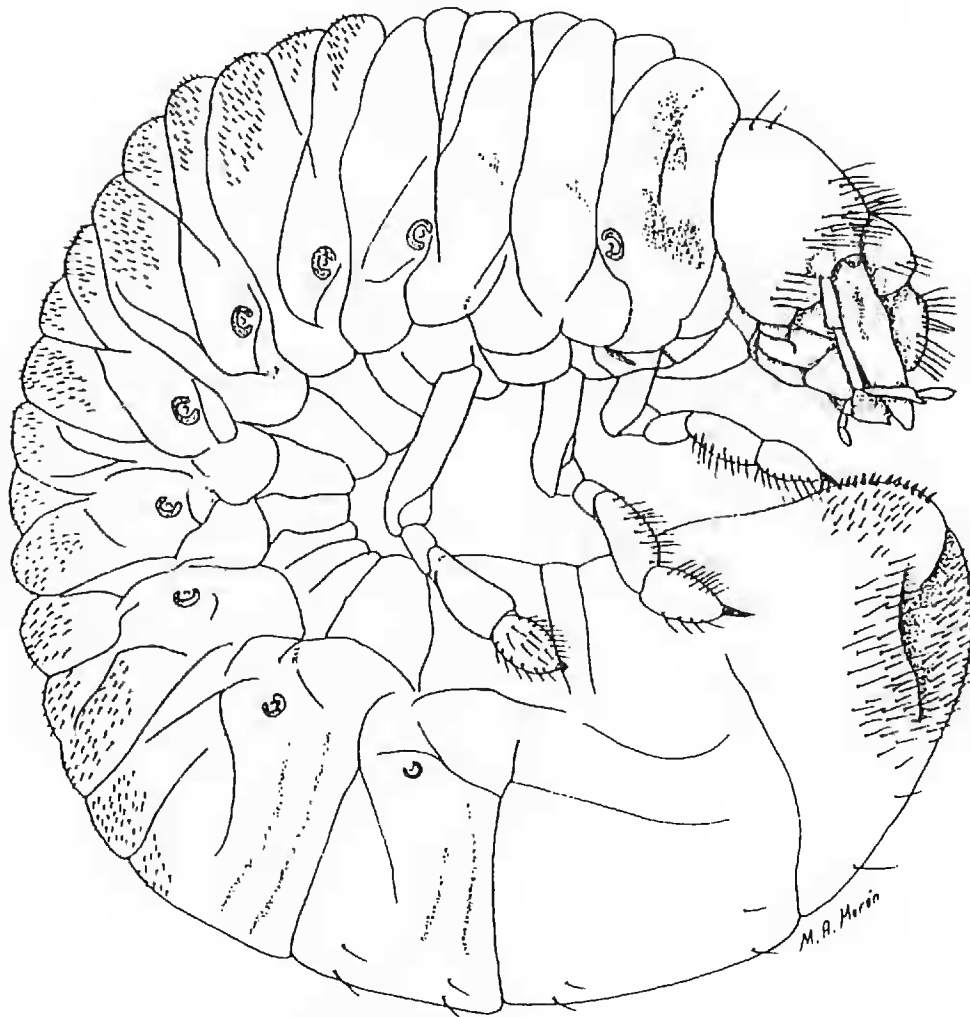
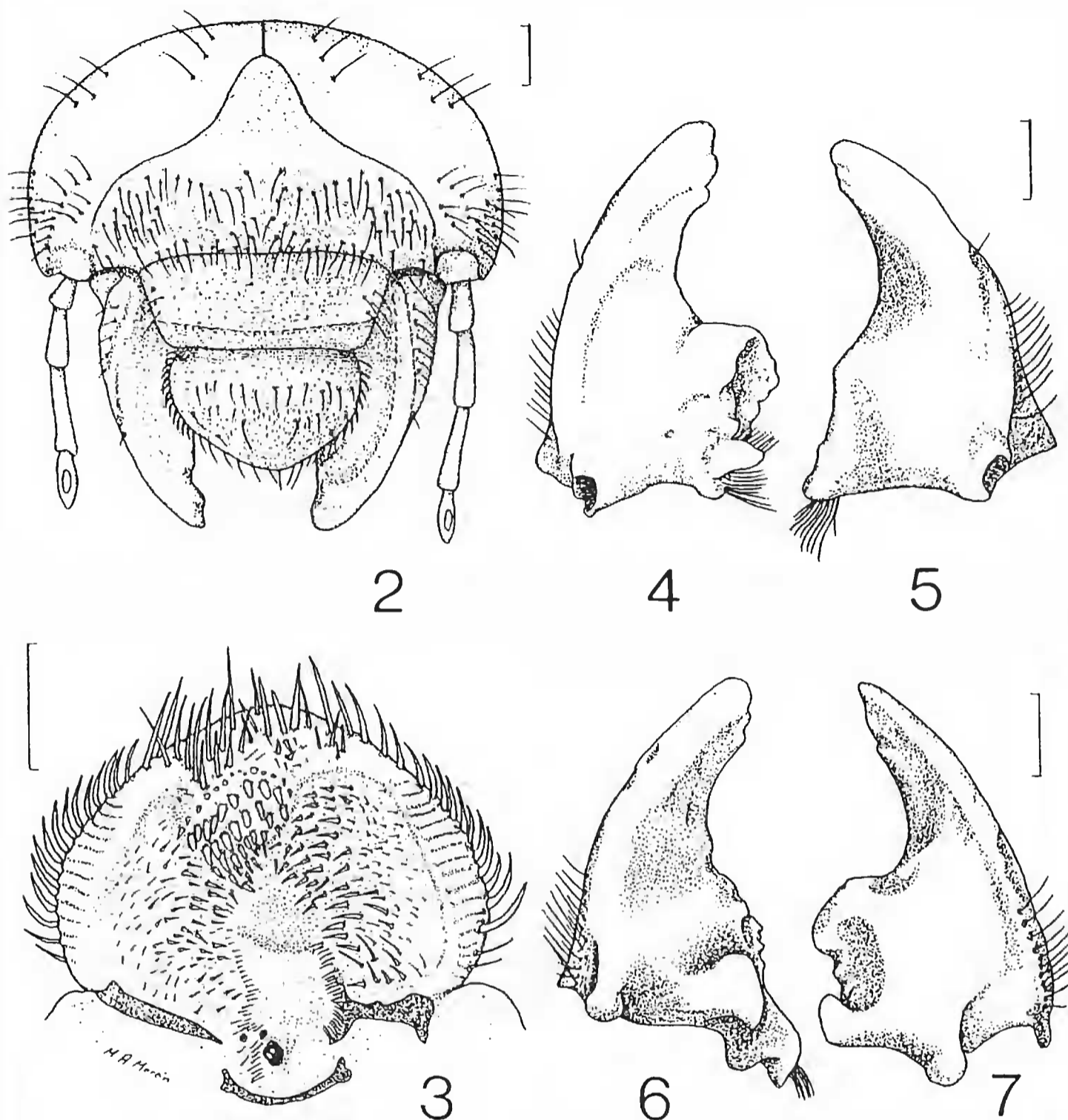


Figure 1. *Phyllophaga lalanza* third stage larva, lateral aspect. Chaetotaxy simplified. Scale line is 5 mm.

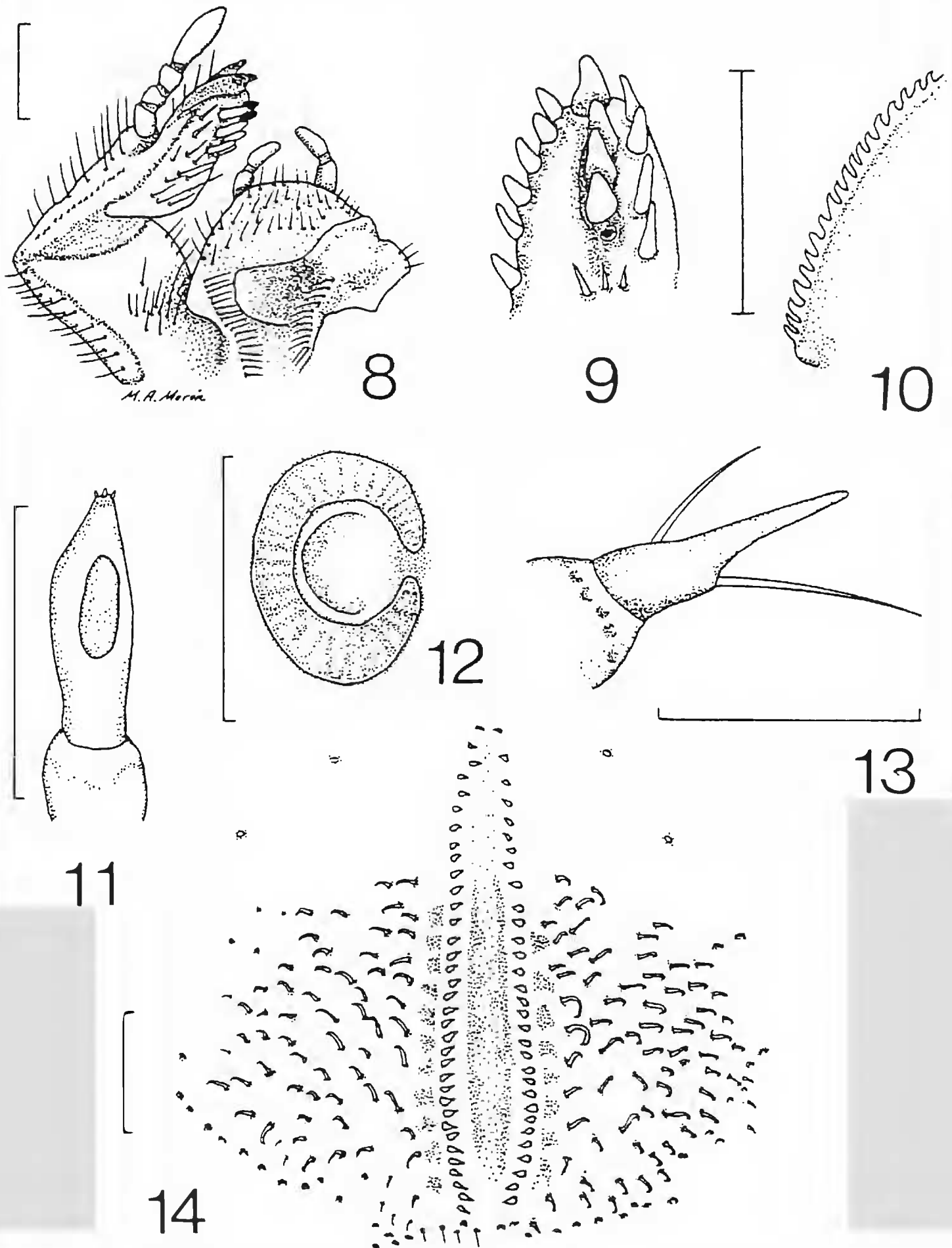
PHYLLOPHAGA (TRIODONYX) LALANZA SAYLOR, 1941
(Figs. 1–15)

Third Instar Larva.—*Head.* Maximum width of head capsule 7.4–8.0 mm. Surface of cranium finely and densely rugopunctate, reddish yellow. Frons (Figs. 1 and 2) with only 1 exterior frontal seta on each side; 26–30 anterior frontal setae; 30–54 posterior frontal setae, laterally mixed with 8–12 exterior frontal setae on each side; each anterior angle of frons with 2 setae; remaining cranial surface with 3–4 dorso-epicranial setae, 3 epicranial setae, 18–20 para-ocellar setae on each side. Clypeus (Fig. 2) with 4 lateral setae. Labrum slightly asymmetrical, lateral margins rounded, 12 posterior setae, 5–7 central setae, and 2–3 lateral setae. Eye spots absent. Epipharynx (Fig. 3) without zygom and epizygom; haptomerum with group of 30–35 heli; each plegmatium with 13 to 18 short plegmata. Proplegmata absent. Dexiophoba and laeophoba large, extending forward from sense cone for more than one half distance between sense cone and heli. Laetorma with 2–3 anterior, short processes. Haptolachus with few microsensillae, Sclerotized plate not developed, but with 2 macrosensillae between sense cone and dexiortorma. Crepis well sclerotized with both ends bifurcated. Each acanthopariae with 14–16 curvate, spine-like setae. Chaetoparia moderately developed, with few microsensilla among the setae. Mandibles (Figs. 4–7) with ventral stridulatory areas absent. Scissorial area of left mandible with distal blade-like portion separated from proximal tooth by scissorial notch; inner margin without tooth; molar area with well developed distal lobe (M1); dorsomolar setae absent; acia long, slightly acute; brustia multisetose. Scissorial area of right mandible formed by 3 short teeth; inner margin without tooth; molar area with 2 irregular lobes; calx enlarged; brustia multisetose. Galea with 1 well developed uncus (Fig. 8); lacinia with 3 terminal unci in a longitudinal row, fused at bases, and each side with 4–6 stout heli in a longitudinal line (Fig. 9). Maxillary stridulatory area with 16–19 sharp-pointed, anteriorly directed teeth, without anterior process (Fig. 10). Hypopharyngeal sclerome asymmetrical, produced on right side into broadened process (Fig. 8). Dorsal surface of last antennal segment with 1 large, oval sensory spot (Fig. 11). *Thorax.* Thoracic spiracles 0.8–0.9 mm measured dorsoventrally; respiratory plate reddish yellow, regularly shaped as a closed “C”; distance between 2 lobes of respiratory plate less than dorsoventral diameter of bulla; spiracular bulla rounded, slightly



Figures 2–7. *Phyllophaga lalanza* Saylor third-stage larva. Figure 2. Frontal view of cranium. Figure 3. Epipharynx. Figures 4 and 5. Dorsal aspect of left and right mandibles, respectively. Figures 6 and 7. Ventral aspect of right and left mandibles, respectively. Scale lines are 1 mm.

prominent. Pronotum with 2 well-marked, yellowish, lateral scleromes at each side (Fig. 1). Dorsa of pro-, meso- and metathorax with sparse, slender setae, without short spinelike setae. Tarsal claws of prothoracic and mesothoracic legs similar, large, each claw bearing 2 setae (Fig. 1). Claws of metathoracic legs reduced in size (Fig. 1). *Abdomen*. Abdominal spiracles of segments 1 to 4 nearly similar in size, 0.8–0.9 mm measured dorsoventrally; respiratory plate reddish yellow, regularly shaped as a closed “C”; distance between 2 lobes of respiratory plate much less than dorso-ventral diameter of bulla; spiracular bulla rounded, slightly prominent (Fig. 12). Respiratory plate with a maximum of about 18 to 24 oval “holes” along any diameter; “holes” not in definite rows. Spiracles of segments 5 to 7 reduced in size, 0.65–0.70 mm; distance between 2 lobes of respiratory plate slightly less than dorso-ventral diameter of bulla. Spiracles of segment 8 noticeably smaller, 0.50–0.52 mm; distance between 2 lobes of respiratory plate equal to dorsoventral diameter of the bulla (Fig. 1). Dorsum of abdominal segments 2 to 7 with large number of spinelike setae and some sparse, long, slender setae; dorsum of segments 8 to 10 with some paired, sparse, long, slender setae (Fig. 1). Venter of segments 1 to 9 with paired, sparse, slender setae. Raster with pair of longitudinal palidia which are slightly



Figures 8–14. *Phyllophaga lalanza* third-stage larva. Figure 8. Dorsal aspect of left maxilla and labium. Figure 9. Apex of right lacinia, mesial view. Figure 10. Stridulatory area of right maxilla. Figure 11. Dorsal aspect of apical antennal segment. Figure 12. Fourth abdominal spiracle. Figure 13. Tarsal claw of fore leg. Figure 14. Palidia and teges. Scale lines are 1 mm.

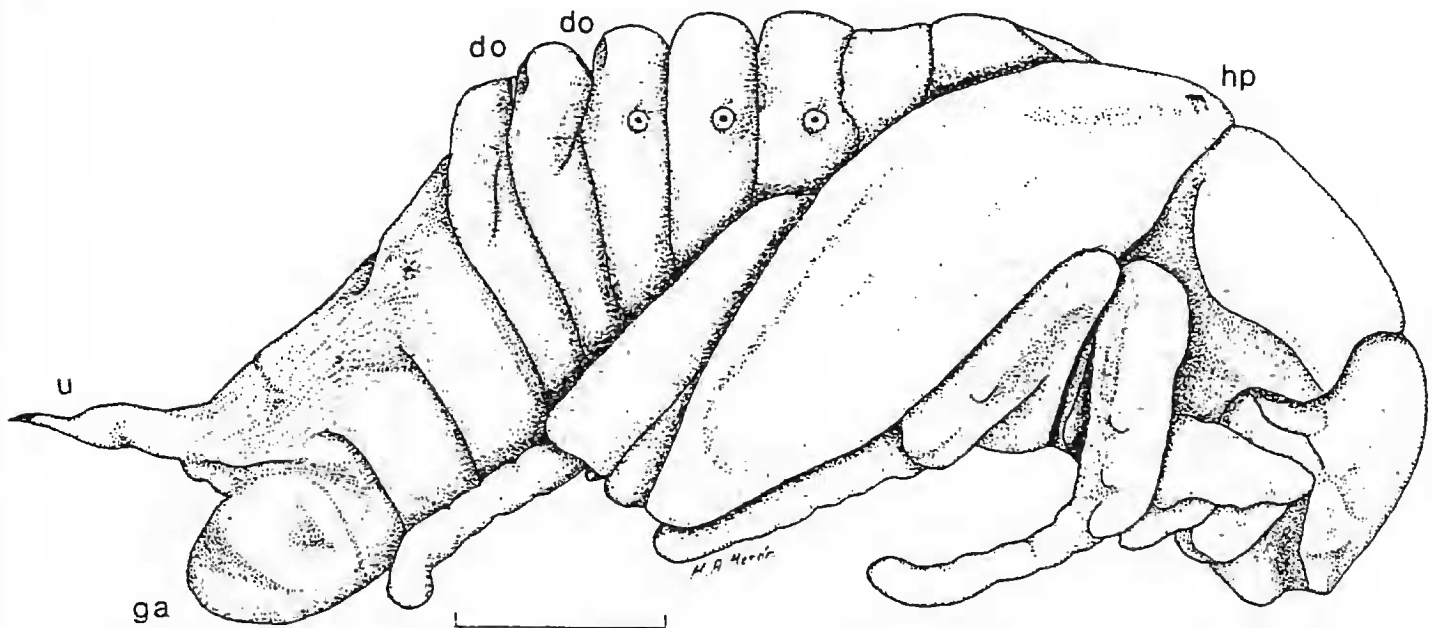


Figure 15. *Phyllophaga lalanza* male pupa, lateral aspect. Note the humeral peg-like projection on the elytral tectus (hp), the dioneiform organs (do) and genital ampulla (ga). Scale line is 5 mm.

convergent anteriorly and posteriorly; each palidium formed by 27 to 37 short, spinelike pali (Fig. 14). Teges formed by 65 to 75 hooked, short setae. Campus with 4 long, slender setae. Barbula dense, with long setae. Dorsal anal lobe with large number of short setae. Lower anal lobe divided by sagittal cleft, with some sparse short setae. Anal slit "Y"-shaped, stem of "Y" shorter than arms of "Y". Approximate total body length: 58–64 mm.

Second Instar Larva.—Similar to third instar except as follows: maximum width of head capsule: 4.70–5.25 mm; frons with 30–52 posterior frontal setae; dorso-ventral diameter of prothoracic spiracles 0.40–0.55 mm; length of metacoxae: 3.0–3.5 mm; each palidium with 29–38 pali.

First Instar Larva.—Similar to second instar except as follows: maximum width of head capsule: 2.9–3.3 mm; frons with 15–26 posterior frontal setae; respiratory plates of thoracic and abdominal spiracles kidney shaped; dorso-ventral diameter of prothoracic spiracles 0.25 mm; one thin eclosion spine at each side of metanotum; length of metacoxae 1.85–2.00 mm; each palidium with 27–39 pali.

Pupa.—*Head.* Glabrous, strongly reflexed downward; antennae and mouth parts clearly differentiated, labrum much exposed, ocular canthi wide, compound eyes sunken (Fig. 15). *Thorax.* Pronotum convex, with shallow depressions at sides and near middle, anterior lateral angles clearly projected. Meso- and metanotum well differentiated. Elytral tectae with shallow, longitudinal sulci and each humeral corner with short, tubercle-like, sclerotized callus. Wing tectae slightly longer than elytra. Protibiae with 3 short processes on external borders. Mesotibiae with vague keels. Metatibiae without keels and apical spurs well differentiated. *Abdomen.* Segments I–VI clearly wider than distal segments. Two pairs of poorly developed dioneiform organs between tergites IV–VI. Pleural lobes rounded and prominent. Spiracle I simple, ovate, with fine peritreme; spiracles II–IV rounded, with wide, prominent peritreme and adjacent sclerotized, small dorsal plate; spiracles V–VI closed, vague; spiracles VII–VIII closed, vague, and surrounded by longitudinal rugae (Fig. 15). Last abdominal tergite with 2 long, sharply pointed, divergent urogomphi. Last abdominal "sternite" in males with smooth, prominent genital ampulla; in females, flattened and deeply striated. Body length, 30–35 mm.

Remarks.—Except for its large size (58–64 mm length) and the high number of long frontal setae, third instars of *P. lalanza* do not have any definite taxonomic character that separates the larvae of the subgenus *Triodonyx* from the known larvae of other subgenera of continental American *Phyllophaga*. The high number of long frontal setae is useful to separate the first and second instars of this species from other small species that live in the Nayarit area. Using the key to species of *Phyllophaga* larvae from the U.S. (Ritcher 1966: 87), *P. lalanza* vaguely keyed to near *P. quercus* Knoch and *P. tristis* Fab. because of the absence of proplegmata in the epipharynx, but it has a raster with closely set palidia formed by more than 13 pali. Using the key to larvae from the Antillean and exotic Melo-

lonthini (Böving 1942: 173), the larvae of the Antillean subgenera *Clemora* Saylor or *Cnemarachis* Saylor show an irregular or dispersed arrangement of pali; *Clemora* does not have proplegmata, and *Cnemarachis* has numerous proplegmata. Some Asiatic species of *Ancylonycha* Dejean have regular pali and do not have proplegmata but have round, black spots on the dorsal side of the cardo, coxae, and near the spiracles. So, the possible relationships of larvae of *Phyllophaga* (*Triodonyx*) species remains obscure. One interesting character observed in the pupa of *P. lalanza* is the presence of humeral, sclerotized, spine-like, elytral calla, but, unfortunately, no other pupae of the genus are described in detail so that a comparison can be made.

Material Examined.—MEXICO: STATE OF NAYARIT, Tepic Municipality, Ejido F. I. Madero, 16 April 1994, S. Hernández & M. A. Morón, soil under sugar cane roots, 760 m, 2 cast skins of third instars associated with immature adults and 4 third instars; 14 third instars, same data except: 15 November 1994, S. Hernández & A. Ramírez; 12 third instars, same data except: Ejido Pochotitán, 10 December 1994, 910 m; 22 third instars, same data except: 18 January 95, 910 m; 63 third instars, same data except: Ejido El Refugio, 3 November 1994, 990 m; 10 third instars, same data except: 10 November 1994; 35 third instars, same data except: 5 December 1994. Two second instars reared from eggs deposited by females collected in Ejido F. I. Madero, 20 July 1994; 6 second instars from Ejido Pochotitán, 17 October 1994, A. Ramírez & S. Hernández, under sugar cane roots, 910 m; 31 second instars, same data except: Ejido El Refugio, 17 August 1994; 25 second instars, same data except: 14 September 1994. Five first instars reared from eggs deposited by females collected in Ejido F. I. Madero, 20 July 1994, 760 m, A. Ramírez; 11 first instars from Ejido El Refugio, 17 August 1994, A. Ramírez & S. Hernández, under sugar cane roots, 910 m. Four male and 4 female pupae collected in Ejido Pochotitán, Potrero La Mesa, 23 April 1994, S. Hernández, A. Ramírez & M. A. Morón, inside pupal chamber located under sugar cane roots, 910 m.

ACKNOWLEDGMENT

We thank M. A. Gutierrez, F. Morales, M. J. de la Paz, E. Vallarta, R. Aguilar, A. & I. Alvarez, J. & M. Carrillo, E. Correa, L. Flores, L. Gil, H. Hernández, R. Juárez, J. M. Lara, J. J. Medina, L. Núñez, M. Pánuco, M. Soto and R. Verdín for their valuable aid during the field and laboratory work. Brett C. Ratcliffe (University of Nebraska State Museum, Lincoln) critically reviewed an early draft of the manuscript and helped with the English translation. Financial support for the publication of this paper was provided by the Instituto de Ecología, A.C. (account 902-02).

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Received 14 Jan 1998; Accepted 21 Apr 1999.